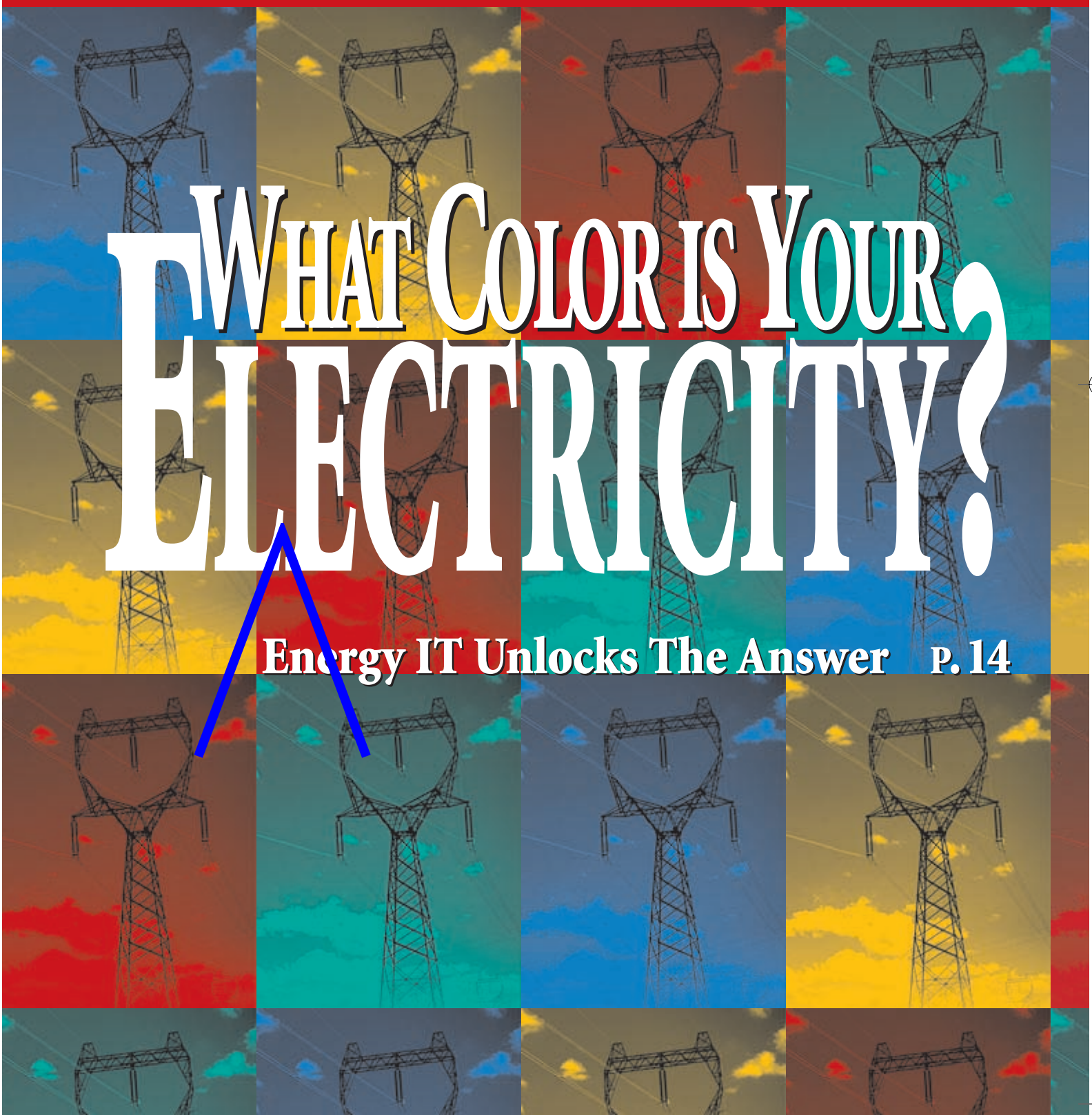
HOW TO AVOID BLACKOUTS, MARKET MANIPULATION P. 26

Public Utilities
Fortnightly



WHAT COLOR IS YOUR ELECTRICITY?

Energy IT Unlocks The Answer P. 14

What Color is Energy Age-

New England regulators and NEPOOL have developed a generation information system that will allow retail participants to procure exactly the type of electricity they want.

By Andrew Greene

IN THE WAKE OF THE CALIFORNIA ELECTRICITY CRISIS, the Enron debacle, and the absence of competitive retail electricity suppliers in many states ostensibly "open for business," there have not been many restructuring success stories. A notable exception may be emerging, however. In New England, Automated Power Exchange, Inc. (APX, Inc.), under contract to the New England Power Pool (NEPOOL) and directed by the Independent System Operator (ISO-NE), has just launched the New England Generation Information System (NE-GIS). NE-GIS will facilitate the accounting and market trading of electricity generators' attributes, such as emission rates, fuel type, and union labor status in a market that is totally unbundled from the existing Market Settlement System (MSS) for transacting electrical energy and ancillary services. This first-ever system will become the accounting and market framework to support the greener side of the New England states' restructuring programs, including electricity labeling, renewable portfolio standards, emissions performance standards, and substantiation of "green" electricity marketing claims.

The creators of the NE-GIS hope to deliver something of a restructuring Holy Grail—a new commodity that could lead to a transparent and efficient market that allows retail suppliers and their customers to procure exactly the type of electricity they want (and may need for regulatory compliance) and to avoid buying what they don't want. It took years of public debate and soul-searching for NEPOOL and New England stakeholders to embark on, and eventually roll

Your Electricity? IT Solves Old Question

out, the NE-GIS. However, some longstanding questions about the NE-GIS approach still linger and will be debated anew as other ISOs and RTOs decide if the NE-GIS is a model to be adopted.

How Did We Get to NE-GIS?

Physically, there is no difference between electric current from a wind farm or from a nuclear power plant when it reaches our homes as alternating current at 60 cycles per second. Nor is there any way for utility grid operators or distribution companies to direct power flows such that only specific generation facilities deliver electricity to particular customers. Yet, with the advent of utility green pricing programs in the early 1990s, we were told the electricity supplied to our homes by the local utility could somehow be "greener" than the guy's next door. The basic proposition of utility green pricing programs to date has been: if you pay a premium for this service, you enable the utility to build or procure renewable resources that would not otherwise have existed or operated. In effect, green pricing represents permission to believe that your electricity is different because your actions alter what happens on the grid.

The power attribute questions inherent in green pricing have been magnified by the arrival of restructuring rules affecting retail suppliers, including labeling requirements, renewable portfolio standards (RPS), emission performance standards (EPS), and substantiation of green-marketing claims. These rules all depend on a consistent and credible means of identifying the attributes of electricity sold by retail suppliers to end-users.

There is widespread recognition that the only meaningful way in which electricity users can establish a nexus between their consumption and their preferred types of generation resources on the grid involves the flow of money from the end-user to the

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generator. Two very different approaches have been suggested to follow the money. The first and perhaps most intuitive approach, "settlement-path tracking," simply uses the MSS to track the payments for energy from end-user back to the generator. The second approach, called "certificate-based tracking," is akin to green pricing in that the premium paid for electricity—in the form of a tradable certificate—is what creates the nexus between the end-user and generator. If the customer is unwilling to pay a premium, there is no preference demonstrated for one form of power over any other.

Advocates of settlement-path tracking found that, while the idea was intuitive, it was cost-prohibitive and a programming nightmare in terms of re-engineering ISO-NE MSS software. Further, premium power sellers dislike settlement-path tracking because the only way they can capture the additional value for their product is to arrange bilateral unit contracts at premium prices. Risk-averse retail suppliers have generally avoided such contracts because they are inflexible, costly, and impose increased risk of exposure to congestion costs. Moreover, even with a bilateral unit contract in place, imbalances between the generator's production and the retail supplier's load can result in lost premiums for the generator (when its surplus power is settled in the spot market), or unwanted purchases from the spot market by the retail supplier when its load outstrips the bilaterally contracted power. The intermittent nature of some renewable resources also tends to exacerbate potential imbalances under bilateral unit contract deals.

Proponents of certificate-based tracking devised a much simpler and less costly administrative mechanism than the proposed modifications to the MSS. The market premium for the right to claim generator attributes of a given plant would be transformed into a new product unbundled from the title to the electrical energy of the associated plant. This right has come to be known as "certificates" in the NE-GIS lexicon (synonymous with "tags" or "tickets" in other markets) and they are denominated in MWhs of the unit's production. Although certificate attributes are unbundled from the MSS, the individual attributes of a given plant can't be separated from one another. A certificate is an indivisible collection of attributes relating to a specific plant. This is the approach used in the NE-GIS.

A key NE-GIS principle is that the MWhs of certificates available for purchase must be equal to the amount of load served (adjusted for losses) to ensure credibility. Therefore, only power actually delivered to the ISO-NE grid and used to serve New England load requirements and exports forms the pool of attributes that is used to create certificates. The certificates available for purchase would reflect the power generated in the ISO region plus imported power, minus power exported to other control areas.

What happens to NE-GIS certificates on the market that fail to attract buyers, such as those for high-emitting coal plants that could imperil compliance with retail environmental standards (e.g., RPS, EPS) or preclude green-power marketing opportunities? At the end of the quarterly certificate-trading period, any "leftover" certificates on the market would be deemed part of the "residual system mix" and assigned at no cost to all load serving entities (LSEs) lacking a sufficient number of certificates to cover their load. This is the essence of the approach that the NE-GIS has adopted to make sure that all loads have associated attributes, even if the LSE chooses not to participate actively in certificate transactions.

How Did the NE-GIS Develop?

The NE-GIS is unique in that it is the first attribute accounting system in the U.S. to encompass the attributes of all power delivered to the grid, not just a subset of power resources such as renewables. The Electric Reliability Council of Texas (ERCOT), in contrast, implemented a tagging system in 2001 (also developed by APX, Inc.), but only for renewable sources addressed by the Texas RPS. The New England states required a comprehensive accounting system given that all power sources are affected by the labeling rules in several New England states, as well as in the upcoming EPS in Massachusetts and Connecticut. (The EPS rules will establish a maximum emission rate per MWh for the generation portfolio associated with each supplier's retail product offerings in these two states.) Another reason to address all sources is substantiating marketing claims. To the extent that a retail supplier's claims go beyond just the renewable content of the product (e.g., "no coal" or "renewable and natural gas only"), a means of verifying such a claim was seen as essential.

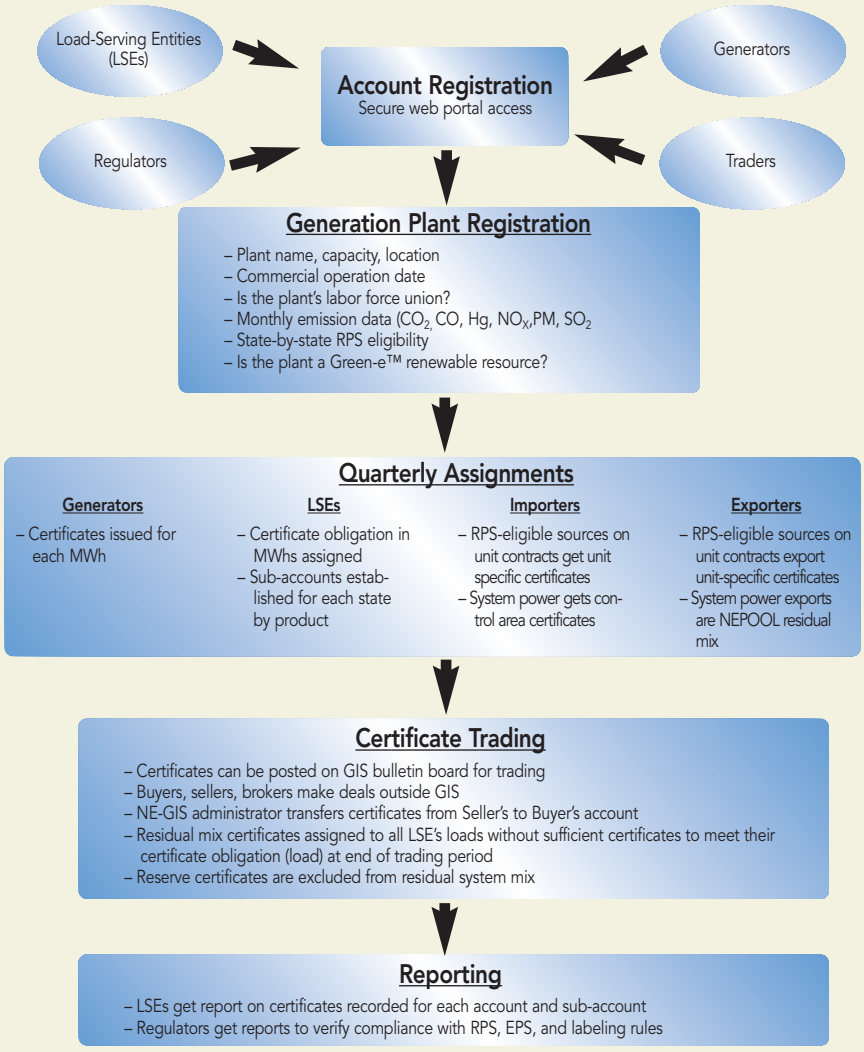
A working group of New England stakeholders, including NEPOOL members, regulators and ISO-NE, met for many months to reach agreement on the parameters of the NE-GIS, to select a contractor to design, operate, and maintain the program and software (APX, Inc. was selected), and to help develop operating rules. The NE-GIS is now operational, and trading of attributes for power that served load in the first quarter of 2002 begins on July 15, 2002, and ends on September 15, 2002. By September 17, each LSE will receive an allocation of the "residual system mix" (that is, the leftover certificates) for any load that did not have corresponding certificates recorded in the NE-GIS. The final step is for the NE-GIS to report the complete portfolio of attributes for the LSE's first-quarter load. This process will be repeated for successive quarterly periods.

How Does the NE-GIS Work?

The NE-GIS is a large database that relies primarily on MSS data for unit production and LSE load data. Many additional sources of data are needed and these are supplied by registered account holders, such as generators and LSEs. Regulators will have the ability to review the accuracy of data entered in the NE-GIS (such as emissions rates entered by generators), and are expected to keep a watchful eye. However, they are not responsible for submitting the data. Generators who do not provide the necessary data will receive default certificates based on the highest emitting coal-fired units. This will certainly help garner participation by generators.

One of the many complexities in designing the NE-GIS is the divergence in New England state regulations supported by the NE-GIS. For example hydropower is an RPS-eligible resource in Connecticut, but not in Massachusetts. Even with such disparities and inconsistencies, the NE-GIS works as a common accounting system because each electronic certificate in the NE-GIS contains a wealth of data indicating how the generation source measures up to each state's definitions and requirements. Thus, a hydropower certificate would indicate that it meets RPS eligibility in Connecticut, but not in Massachusetts. Forty-two separate data fields are included on each certificate that allow prospective buyers to ascertain readily how the certificate addresses regulatory parameters in each state. If the New England states develop

Figure 1: NE-GIS Process Flowchart



Graphic design: Jamie J. Flowers

additional distinctions in how certificates support regulatory provisions, the number of data fields inevitably can and will grow.

Although the NE-GIS records the transfer of certificates between buyers and sellers, it is not a trading system, and transactions are executed outside of the NE-GIS. However, a bulletin board is offered that allows holders of certificates to broadcast their availability for sale, and to provide contact information to facilitate deals off-line.

What Are the Market Implications of NE-GIS?

While it is early to gauge the potential impact of the NE-GIS on the New England electricity industry, there is reason to believe that it will be significant. The chief reason is that NE-GIS certificates could make it very easy for generation sources to capture additional market value driven by the suite of retail environmental standards (labeling, RPS, and EPS) and value-added marketing strategies, such as green electricity and other offerings that could appeal to retail customer preferences.

David L. O'Connor, commissioner of the Massachusetts Division of Energy Resources, notes that "the NE-GIS is both distinctive and progressive in its design. By providing all-inclusive information on generation attributes, it establishes the framework for the market to internalize the costs of both green and brown generation. We now have the tremendous ability to advance clean and sustainable electricity generation with strong, transparent market signals."

Dennis Duffy, vice president of Cape Wind Associates (which is developing a 420 MW offshore wind project in Massachusetts—the first of its kind in the nation), stresses that the NE-GIS offers the public the dual benefits of lower energy prices and cleaner air. "The NE-GIS allows renewable producers to realize the environmental value of their product through certificate sales outside the MSS. The result is that wind generators, like Cape Wind, will submit energy bids to the ISO-NE that include no fuel costs or attribute premiums. This will displace higher-cost, pollutant-emitting units and place downward pressure on energy clearing prices." Duffy concludes that, "the NE-GIS will be a critical factor in encouraging the development of renewable energy projects throughout the region."

How much will certificates be worth? Not surprisingly, it will depend on supply and demand in the market. As of yet, there is no actual market data to answer this ques-

Figure 2: Illustrative Retail Customer Energy Label

NE-GIS certificates will become the basis of the data seen on retail supplier energy labels like the one for NSTAR default service. With NE-GIS certificates, all power sources are "known" and the label is likely to be simplified accordingly.

Generation Price

Six-month fixed and variable prices per kwh. Prices do not include regulated charges for customer services and delivery.

Customer Group	6-month fixed price	Monthly Variable Price					
	Jan.-June 2002	Jan. 2002	Feb. 2002	March 2002	April 2002	May 2002	June 2002
Residential	6.393	6.823	6.794	6.085	6.034	6.099	6.464
Small Commercial/ Industrial/Lighting	6.574	7.044	7.105	6.311	6.172	6.220	6.536
Large Commercial/ Industrial	6.549	7.346	7.166	5.993	5.939	6.023	6.715

Prices effective through June 30, 2002

Contract

The prices and terms for **Default Services** are regulated by the Department of Telecommunications and Energy. **Default Service** is set by the market and is available as a six-month fixed price or a monthly variable price. Customers may leave this service on their meter read date provided the company receives a minimum of two days notice. Budget billing is available to customers who want to make fixed monthly payments.

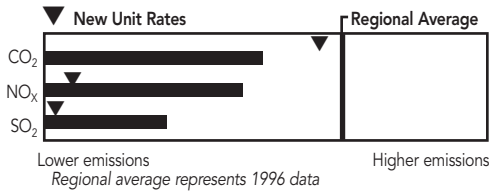
Power Sources

Demand for this electricity in the period 1/1/01 – 12/31/01 was assigned generation from the following sources

Power Source	Known Resources	System Power	Total
Biomass	0%	1%	1%
Coal	0%	8%	8%
Hydro: Large	0%	1%	1%
Hydro: Small	0%	2%	2%
Imported Power	0%	8%	8%
Municipal Trash	0%	2%	2%
Natural Gas	22%	6%	28%
Nuclear	28%	0%	34%
Oil	4%	12%	16%
Other Renewable	0%	0%	0%
Solar	0%	0%	0%
Wind	0%	0%	0%

Air Emissions

Carbon dioxide (CO_2) nitrogen oxide (NO_X) and sulfur dioxide (SO_2) emissions rates from these sources, relative to the regional average, and to the emission rates of a new generating unit. Regional average represents 1996 data.



Regional average represents 1996 data

Labor Information

67% of the electricity came from power sources with union contracts with their employees.

tion. However, a clue may be contained in the final RPS regulation recently issued by the Massachusetts Division of Energy Resources (DOER), which, in effect, sets a ceiling price of $50 per MWh for qualifying renewable certificates (non-hydro renewables placed in service or uprated after December 31, 1997). The DOER's cost projections indicate that a price for renewable certificates in the neighborhood of $20 to $25 per MWh should ensure that the Massachusetts RPS targets are met. This certificate value would supplement the market value of the energy and could represent a substantial premium over the current $30 per MWh market clearing prices for energy in the ISO-NE wholesale market.

Renewables are not the only generation sources that may see incremental revenue opportunities in the certificates market, particularly when the EPS requirements take effect in Massachusetts in 2003 and sometime later in Connecticut. Other clean sources of power such as new combined-cycle gas units and nuclear generation could realize additional revenue in the certificates market, given their ability to reduce a retail supplier's product emission rates.

Global energy giant Entergy Corp., the first U.S. utility to voluntarily cap its CO_2 emissions at its 2000 level, sees a NE-GIS-like system as a potential benefit to both consumers and the environment. "Such a system seeks to put a value on the environmental attributes of all energy sources and lets the market reflect the higher value of clean energy, so consumers can see what they're buying," says Entergy CEO Wayne Leonard. Entergy has set aside $25 million for emission-reduction projects and, last December, purchased from Danish utility Elsam SA the first international trade of greenhouse gas allowances—10,000 metric tons of CO_2 emissions that Entergy retired to improve the environment. Leonard sees even greater potential for nuclear energy. "For the first time, the marketplace would be recognizing and assigning an economic value to the environmental benefit of zero-emission nuclear power."

NE-GIS certificates may also be able to breathe life back into the moribund competitive retail supply business by making it much easier for retailers to secure the attributes that customers find appealing, without the risks and hassles of having to enter into bilateral unit contracts. The new certificate market will facilitate green product offerings in New England where customer interest has always been high according to market research, but suppliers have struggled with the twin difficulties of economically acquiring renewables on a bilateral unit contract basis and the relatively low standard offer prices. New niche retail products could also come to market emphasizing other potentially desirable attributes reflected on the NE-GIS certificates such as union labor status (product jingle idea: "look for the union label"), geographic location (how about: "Connecticut Kilowatts"), or fuel type (maybe even: "Go Nukes!—If you care about the air!").

The creators of the NE-GIS hope to deliver something of a restructuring "Holy Grail"—a new commodity that could lead to a transparent and efficient market that allows retail suppliers and their customers to procure exactly the type of electricity they want (and may also need for regulatory compliance) and to avoid what they don't want.

A range of new market services could also spring from the NE-GIS. Brokers and other financial intermediaries will find opportunities to arrange transactions between buyers and sellers, as well as create related products such as put and call options, forward certificates, and risk-management products. The clarity of current market prices and forward price signals for a diverse range of electricity attributes should help project developers identify and monetize market values for the specific attributes associated with their projects.

Another market segment that stands to benefit from the NE-GIS is small, distributed generators, including net metering installations. The NE-GIS operating rules

allow for non-MSS generators (less than 5 MW capacity) to receive NE-GIS certificates (even if they do not produce positive net energy for the grid), provided their electrical production is measured by revenue-quality metering pursuant to ISO-NE rules. The NE-GIS rule allows small generators to bank their generation over multiple months until they have enough output to receive a certificate, which corresponds to one MWh. The rule also allows small generators to have their production aggregated by entities that interface with the NE-GIS on their behalf. Collectively, these provisions could provide an important financial boost to distributed generation installations with renewable and other valued market attributes.

The NE-GIS rule allows certificates for renewable resources (that meet at least one New England state's definition of renewable) to be sold as a "reserved certificate" to almost anyone, anywhere — even if the associated energy was not delivered into the reserved certificate buyer's market area. Reserved certificates have two unique uses: (1) environmentally minded end-users in the NEPOOL market can purchase reserved certificates directly to "green-up" their electricity purchases above and beyond what their retail supplier may offer; or (2) reserved certificate buyers anywhere outside of NEPOOL (including those in foreign countries) may acquire certificates to take title to the green attributes and thereby demonstrate a proactive environmental commitment or possibly even meet provisions of the Kyoto Protocol, which recognize the greenhouse gas avoidance benefits of renewable and other "zero-emission" resources. Ultimately, reserved certificates are retired and the related attributes are no longer available for purchase by New England LSEs for inclusion in the residual system mix certificates. To ensure an adequate supply of certificates to meet the total LSE "certificate obligations" (load), the NE-GIS essentially "mints" additional certificates for each reserved certificate retired, using the characteristics of the residual system mix.

Lingering Issues

The NE-GIS system, while very promising, also is subject to some longstanding questions that have been around since the first proposal for "tags" was offered years ago. A key set of concerns relates to consumer acceptance of certificates as the means of defining the attributes of electricity they receive. To illustrate this concern, suppose a retail supplier has a bilateral unit contract with a coal-fired plant but does not contract for the associated coal certificates. Instead, the retailer procures wind-power certificates, and proceeds to market its electricity product as "wind power." Certainly, this situation has the potential to be viewed by consumer and regulator alike as deceptive unless accurate information is conveyed to the consumer.

NE-GIS certificates may also be able to breathe life back into the moribund competitive retail supply business by making it much easier for retailers to secure the attributes that customers find appealing, without the risks and hassles of having to enter into bilateral unit contracts.

In its Environmental Marketing Guidelines for Electricity (1999), the National Association of Attorneys General (NAAG) reviewed the use of certificates in electricity marketing and noted: "It is recommended that certificate-based claims be accompanied by a clear and prominent disclosure of the use of a tagging system to substantiate the claim." In addition, NAAG noted that "marketers are cautioned to avoid making claims based on a tagging system that state or imply that the supplier has actually purchased the power itself—as opposed to its environmental attributes—from the preferred generators." By following these guidelines, says NAAG, the retail supplier's use of certificates would not be deceptive.

Another area of concern has been how the NE-GIS program would mesh with power flows to and from neighboring control areas that currently lack comparable attribute

systems, and in many cases, also lack similar retail environmental standards. One area of concern is so-called "greenwashing" of power, whereby neighboring regions might claim that high-value renewable resources are exported to New England, while New England sources could claim they are exporting high-emission power to other control areas.

The NE-GIS rules effectively preclude such cross-border gaming activity by allowing only the import or export of certificates for specific plants if: (1) they are RPS-eligible resources (under any one or more of the prevailing New England state definitions); (2) are transacted under a unit contract; (3) have demonstrable export/import settlement documentation in the MSS; (4) have transmission path documentation pursuant to National Electric Reliability Council (NERC) tags; and (5) the seller certifies that it has not sold or otherwise conveyed the specific attributes anywhere else. Any other imports or exports of power are treated as system power without a specified fuel type: export certificates will carry the emissions profile of the NEPOOL residual system mix, and import certificates will carry the overall emission profile of the exporting control area.

Ultimately, the integrity of the NE-GIS rests on the fact that certificates in circulation correspond one-to-one with actual power furnished to the grid, with no double counting, and no "blind spots." NEPOOL, ISO-NE, and the New England regulators have gone to great lengths to assure the integrity of the NE-GIS certificates.

What's Next?

What does the NE-GIS mean for other regions of the country? Many of the policy and market drivers that brought the NE-GIS into existence in New England are present elsewhere, including a continuing movement (however snail-like) toward restructuring, emerging retail environmental standards, green marketing activities, and a desire to develop clearer price signals about the value of various generation attributes. Currently, the New York ISO, the PJM ISO, and the Ontario Independent Market Operator are each moving forward on their own systems for generation attributes. In the context of the Northeast RTO discussions, FERC has identified the NE-GIS as a "best practice" that it would like to see incorporated in other RTOs under development.

Ultimately, something akin to the NE-GIS may be needed at the national level. The U.S. Senate Energy Bill (S. 517) heading to conference committee at press time includes a provision for a federal RPS that would be satisfied with Renewable Energy Credits (RECs), to be administered by the Department of Energy. Functionally, there is little difference between an REC and an eligible renewable NE-GIS certificate with regard to RPS compliance.

The NE-GIS model should be examined closely, and if deemed appropriate, adopted at the national level to support the federal RPS and other state and national regulatory and market needs that are bound to grow over time. A single, comprehensive GIS at the federal level could avoid a number of potential pitfalls if emerging GIS systems across North America are incompatible, vulnerable to double counting, or have blind spots due to jagged seams. The many flavors of restructuring rules (and lack thereof) in New England demonstrate that the NE-GIS approach—perhaps even at the federal level—is extremely flexible, and need not impinge on, or usurp, state policy making relating to retail environmental standards.

In any event, thanks to the NE-GIS, we in New England will now have a ready answer to the question: what color is your electricity? F

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